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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/401,701	09/23/99	NELSON C	1403-SPL

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EXAMINER	
TSAI,C	
ART UNIT	**PAPER NUMBER**
2857	

DATE MAILED: 11/08/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Offic Action Summary	Application No.	Applicant(s)	
	09/401,701	NELSON ET AL.	
	Examiner	Art Unit	
	Carol S Tsai	2857	

-- The MAILING DATE of this communication appears on the cov r sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 September 1999* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 September 1999* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because the blank boxes shown should be labeled as to their function, for example: elements 1, 4, 5, and 6 in Fig. 4, as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,646,525 to Gilboa in view of U. S. Patent No. 3,996,590 to Hammack.

Gilboa discloses a magnetic sensor system for determining the three-dimensional position, velocity and acceleration of an object utilizing magnetic field currents, the sensor system being capable of operating within close proximity to metal surfaces and metal objects, comprising: an object , the position, velocity and acceleration of which are to be determined (see Abstract, lines 1-12; and col. 2, lines 11-16; and col. 5, line 9 to col. 7, line 51); a three-dimensional fixed reference frame of known dimensions in which the object is located with the fixed reference frame (see col. 2, lines 3-6; col. 8, lines 29-38; and col. 11, lines 43-47); a power

source (current drive & oscillator 50 shown on Fig. 8) capable of generating a magnetic field within the fixed reference frame (see Abstract, lines 1-12; col. 2, lines 3-64; col. 9, line 59 to col. 10, line 12; col. 10, lines 46-62; col. 11, lines 48-51); a magnetic field transmitter, the transmitter operatively interconnected to the power source and capable of being geometrically arbitrarily oriented relative to the fixed reference frame (see col. 3, lines 4-7; col. 4, lines 45-65; and col. 12, lines 44-47); at least one magnetic field receiver, the receiver capable of receiving electronic signals from the transmitter and further capable of being geometrically arbitrarily oriented related to the fixed reference frame (see col. 2, lines 44-50; col. 6, line 64 to col. 7, line 10; and col. 11, lines 60-65); and a programmed computer, the computer capable of receiving the signals from the receiver and further capable of calculating the position, velocity and acceleration of the object based upon the signals (see Abstract, lines 6-12; col. 2, line 12 to col. 3, line 38; col. 6, line 64 to col. 8, line 16; and col. 11, lines 52-59).

Gilboa does not disclose a plurality of magnetic field transmitters.

Hammack teach a plurality of magnetic field transmitters (transmitters 50 shown on Fig. 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gilboa's device to include a plurality of magnetic field transmitters, as taught by Hammack, in order that the transmitters can operate collectively and separately with various groups of receivers in order to form a variety of subsystems for the detection of targets of various characteristics and locations (Hammack, col. 20, lines 39-41).

As to claim 2, Gilboa does not disclose the power source being capable of generating AC magnetic fields.

The Examiner takes Official Notice that an electrical power source capable of generating AC magnetic fields, is well known in the art.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gilboa's method to include the power source being capable of generating AC magnetic fields, in order to produce the magnetic field.

As to claim 3, Gilboa also discloses the transmitter being a permanent magnet (permanent magnet 63 shown on Fig. 9B).

As to claim 4, Gilboa also discloses the receivers being Hall effect sensors (see col. 2, lines 44-50 and col. 4, lines 51-61).

As to claims 5 and 7, Gilboa also discloses the sensor system being capable of recording individual receiver signals at high speed (see col. 6, line 64 to col. 7, line 10).

As to claim 6, Gilboa also discloses the sensor system being capable of being self-calibrating (see col. 7, lines 21-26).

4. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,646,525 to Gilboa in view of 5,307,072 to Jones, Jr. and U. S. Patent No. 3,996,590 to Hammack.

Gilboa discloses a method for determining the position, velocity and acceleration of an object, comprising: providing a three dimensional fixed reference frame of known dimensions (see col. 2, lines 3-6; col. 8, lines 29-38; and col. 11, lines 43-47); providing an object, the position, velocity and acceleration of which are to be measured (see Abstract, lines 1-12; and col. 2, lines 11-16; and col. 5, line 9 to col. 7, line 51); generating electrical current from an oscillator

and generating a magnetic field from the transmitter in the reference frame (see Abstract, lines 1-12; col. 2, lines 3-64; col. 9, line 59 to col. 10, line 12; col. 10, lines 46-62; col. 11, lines 48-51); receiving the magnetic field signal from the transmitter into at least one receiver (see col. 2, lines 44-50; col. 6, line 64 to col. 7, line 10; and col. 11, lines 60-65); and applying a mathematical algorithm to calculate the position, velocity and acceleration of the object (see Abstract, lines 6-12; col. 2, line 12 to col. 3, line 38; col. 6, line 64 to col. 8, line 16; and col. 11, lines 52-59).

Gilboa does not disclose a plurality of magnetic field transmitters.

Hammack teach a plurality of magnetic field transmitters (transmitters 50 shown on Fig. 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gilboa's device to include a plurality of magnetic field transmitters, as taught by Hammack, in order that the transmitters can operate collectively and separately with various groups of receivers in order to form a variety of subsystems for the detection of targets of various characteristics and locations (Hammack, col. 20, lines 39-41).

Gilboa does not disclose delivering the current from the oscillator to a power amplifier; directing the amplified current from the amplifier to a plurality of transmitters; demodulating and amplifying the received magnetic field signal into magnetic field components from the receiver signal in which the output from the amplifier is proportion to the magnetic field components; and applying a mathematical filter to the demodulated and amplified signal.

Jones, Jr. teaches delivering the current from the oscillator to a power amplifier; directing the amplified current from the amplifier to a plurality of transmitters; demodulating and amplifying the received magnetic field signal into magnetic field components from the receiver

signal in which the output from the amplifier is proportion to the magnetic field components; and applying a mathematical filter to the demodulated and amplified signal (see Fig. 1 and col. 3, line 30 to col. 4, line 62).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gilboa's method to include delivering the current from the oscillator to a power amplifier; directing the amplified current from the amplifier to a plurality of transmitters; demodulating and amplifying the received magnetic field signal into magnetic field components from the receiver signal in which the output from the amplifier is proportion to the magnetic field components; and applying a mathematical filter to the demodulated and amplified signal, as taught by Jones, Jr., in order that the output of the synchronous demodulator goes through a low pass filter which smoothes the signal providing a DC output proportional to the received signal component (Jones, Jr. col. 4, lines 41-44).

As to claim 10, Gilboa does not disclose the power source being capable of generating AC magnetic fields.

The Examiner takes Official Notice that an electrical power source capable of generating AC magnetic fields, is well known in the art.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gilboa's method to include the power source being capable of generating AC magnetic fields, in order to produce the magnetic field.

As to claim 11, Gilboa also discloses the mathematical algorithm mathematically modeling the transmitters as dipoles, the algorithm further uses total field and vector magnetic field mathematically components to calculates the three-dimensional position of the object (see

Abstract, lines 6-12; col. 2, line 12 to col. 3, line 38; col. 6, line 10 to col. 8, line 16; and col. 11, lines 52-59).

As to claim 12, Gilboa does not disclose placing calibrated magnetic field receivers at a known location in an uncalibrated transmitter geometry in which the algorithm determines the location of the transmitter in the fixed reference frame.

Jones, Jr. teaches placing calibrated magnetic field receivers at a known location in an uncalibrated transmitter geometry in which the algorithm determines the location of the transmitter in the fixed reference frame (see col. 2, lines 41-52 and col. 7, lines 28-50).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gilboa's method to include placing calibrated magnetic field receivers at a known location in an uncalibrated transmitter geometry in which the algorithm determines the location of the transmitter in the fixed reference frame, as taught by Jones, Jr., in order to compensate either the sensed field data or the position and orientation solution data (Jones, Jr. col. 2, lines 51-52).

As to claim 13, Gilboa does not disclose expressly the algorithm mathematically averages the signals from the receivers.

It is, however, considered inherent that Gilboa includes the algorithm mathematically averaging the signals from the receivers (see Abstract, lines 6-12; col. 2, line 12 to col. 3, line 38; col. 6, line 64 to col. 8, line 16; and col. 11, lines 52-59), because such calculating can be provided by the controller is known to be a necessary function in order that the requested mathematical processing can be performed.

As to claim 14, Gilboa also discloses the algorithm mathematically treating eddy currents generated in metal surface and objects nearly the transmitter as virtual magnetic field transmitter, the algorithm further calculating the position and orientation of the virtual field transmitter (see Figs. 1, 2, and 6; Abstract, lines 6-12; col. 2, line 12 to col. 3, line 38; col. 6, line 64 to col. 8, line 16; and col. 11, lines 52-59).

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gilboa in view of Hammack as applied to claim 1 above, and further in view of U. S. Patent No. 5,307,072 to Jones, Jr.

As noted above, Gilboa in combination with Hammack teach all the features of the claimed invention, but do not disclose the transmitters being capable of generating frequencies in the range of 20-100 KHz.

Jones, Jr. teaches the transmitters being capable of generating frequencies in the range of 20-100 KHz (see col. 3, lines 30-34).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Gilboa in combination with Hammack's method to include the transmitters being capable of generating frequencies in the range of 20-100 KHz, as taught by Jones, Jr., in order to diminish the noise to signal ratio.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Schneider discloses a method and apparatus for determining the position and orientation of a remote object relative to a reference coordinate frame includes a plurality of field-generating elements for generating electromagnetic fields, a drive for applying, to the generating elements, signals that generate a plurality of electromagnetic fields that are distinguishable from one another, a remote sensor having one or more field-sensing elements for sensing the fields generated and a processor for processing the outputs of the sensing element(s) into remote object position and orientation relative to the generating element reference coordinate frame.

Acker discloses a magnetic position and orientation determining system using magnetic fields, desirably including uniform fields from Helmholtz coils positioned on opposite sides of a sensing volume and gradient fields generated by the same coils.

Gilboa discloses apparatus for determining the position and orientation of a helmet worn by a crew member in a vehicle including a generator, associated with the vehicle, which produces a rotating magnetic and electric field of fixed strength, orientation and frequency within at least a portion of the vehicle.

Motazed et al. disclose a target signal transmitter to induce an electromagnetic signal in the hidden object, a position reference transmitter to transmit a signal for positioning purposes, a sensor unit to detect changes in the magnetic flux of the hidden object due to the induced electromagnetic signal and the positioning signal from the position reference transmitter, and a central unit to process and display a map of the hidden object.

Blood discloses position and orientation of receiving antennae with respect to magnetic field transmitting antennae.

Anderson discloses a remote object position and orientation determining system

employing electromagnetic coupling to sense the position and orientation of a remote object.

Bauer discloses a system being provided for tracking the three-dimensional position of an object within a three-dimensional region by triangulation techniques to generate signals corresponding to such three-dimensional positions.

Egli et al. disclose an electromagnetic system for determining the orientation including position of a helmet worn by a pilot, having a transmitting antenna for transmitting electromagnetic field vectors, a receiving antenna for sensing the electromagnetic field vectors, a control apparatus responsive to the sensed electromagnetic field vectors and the transmitted electromagnetic field vectors for determining the orientation including location of the helmet, the control apparatus having a first output for supplying the orientation to a utilization apparatus and a second output, a driver for supplying driving energy to the transmitting antenna coils, and a selector switch connected to the second output of the control apparatus and to the driver for sequentially energizing the coils of the transmitting antenna.

Contact Information

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carol S. Tsai whose telephone number is (703) 305-0851. The examiner can normally be reached on Monday-Friday from 7:30 AM to 4:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703) 308-1677. The fax number for TC 2800 is (703) 305-7382. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2800 receptionist whose telephone number is (703) 308-1782.

In order to reduce pendency and avoid potential delays, Group 2800 is encouraging FAXing of responses to Office actions directly into the Group at (703) 308-7382. This practice may be used for filing papers not requiring a fee. It may also be used for filing papers which require a fee by applicants who authorize charges to a PTO deposit account. Please identify the examiner and art unit at the top of your cover sheet. Papers submitted via FAX into Group 2800 will be promptly forwarded to the examiner.

Carol S. Tsai

10/24/01

MARC S. HOFF
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